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Via Facsimile (total pages: 9)
Confirmation via Mail

July 1, 2002

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CONFIRMATION COPY

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Re: Taiwan Patent Application No.: 89126950
Applicant: James Hardie Research Pty Limited
Title: Method and apparatus for extruding cementitious articles
Your Ref.: 25754TWP00 PGH/KS
Our Case No.: 834457

Dear Mr. Harrison,

This is in response to your letter of June 14, 2002, instructing us to prepare an English translation of the cited China Utility Model Patent Publication No.2068048U. The full translation of the cited reference is attached herewith for your reference.

As to whether the cited reference was cited against all of the claims of the present application. Please be advised that in local practice, it is very common that a prior art reference is cited against the main technical thought or measure of the invention described in the specification rather than certain specific claims. In other words, the rejection is made more on an application-by application basis than on a claim-by-claim basis, and hence we have to take it as that the cited reference was cited against all of the claims.

Of course if the applicant believes that the claims on file are patentable over the cited reference, the applicant may just present arguments to defend the patentability of claims on file without making claim amendments.

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Title of invention: Extruder for cement and asbestos paste
Filing date: April 9, 1990
Date of publication: December 26, 1990

What is claimed is:

1. An extruder for cement and asbestos paste, comprising a base (9) and an extruding sleeve, a front end of the extruding sleeve being provided with an extruding outlet (10) communicating with a die (49) for a member, a rear end of the extruding

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sleeve being provided with a feeding inlet (12), at least one extruding screw connecting to a motor being provided in the extruding sleeve, an exhaust pipe communicating with the feeding inlet and connecting to a vacuum machine being also provided in the extruding sleeve, characterized in that

the output area of the extruding outlet is smaller than the input area thereof, the periphery of the extruding sleeve are provided with a cavity and a water-cooling chamber(14) of pipes(19, 20) for charging and discharging water, the feeding inlet communicates with a delivering sleeve, a rear end of the delivering sleeve is provided with a hopper, at least one delivering screw connecting to the motor is provided in the delivering sleeve and at least one fixing stirrer (45) having flat triangular blades (46) is provided in the delivering sleeve.

2. The extruder for cement and asbestos paste according to claim 1, wherein the flowing passage of the extruding outlet has a shape of a conical tube.

3. The extruder for cement and asbestos paste according to claim 1, wherein the water-cooling chamber is annular and constituted of the extruding sleeve and the outer sleeve thereof.

4. The extruder for cement and asbestos paste according to claim 3, wherein a plurality of annular heat sinks are provided in the outer periphery of the extruding sleeve of the water-cooling chamber.

5. The extruder for cement and asbestos paste according to claim 1, wherein a plurality of longitudinal inserting strips are provided in the inner periphery of the extruding sleeve.

6. The extruder for cement and asbestos paste according to claim 1, wherein the extruding sleeve and the delivering sleeve are perpendicular to each other.

7. The extruder for cement and asbestos paste according to claim 1, wherein two delivering screws are provided in the delivering sleeve.

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8. The extruder for cement and asbestos paste according to claim 1, wherein the fixing stirrer is flat with two annular portions and a plurality of flat triangular blades are provided in the inner periphery of the annular portion.

Description of this invention

This invention relates to an apparatus for manufacturing architectural material members, especially to an extruder for extruding cement and asbestos paste.

In the manufacture of the cement and asbestos building materials, cement and asbestos thin-plate materials made by grinding are cut into required shape and glued by binders to form members. In order to improve the strength of the members, some members even comprise a keel to be a framework. This kind of members will warp a lot and the cement and asbestos thin plates require long fiber asbestos materials. Therefore, the society of building materials are trying to manufacture the cement and asbestos members by forcefully extruding the cement and asbestos paste into dies for the members so that an ideal effect can be obtained.

In the conventional apparatus for extruding the building members, such as an extruder for the pre-stressed concrete published in CN 85102514A, CN86210916U by the China Patent Office, a concrete single plate is made from steel bars, cement and sandstone. This kind of extruder is constituted of a movable base, a motor and the transmission mechanism thereof, a screwed reamer, a vibrator, a positioner, cutting blade means and an upper hopper. The operation is carried out on a wide filed reinforced by steel bars in advance. The cement and sandstone paste mixed uniformly is fed into the upper hopper, extruded by the screwed reamer, vibrated to form solidly by the vibrator, cut by the cutting blade and dried to form a single-plate member. This kind of extruder is merely adapted to extrude the cement and sandstone paste to manufacture pre-stressed concrete members but not adapted to extrude the cement and asbestos paste to manufacture the cement and asbestos members.

In view of this, the object of this invention is to provide an extruder for extruding and stirring the cement and asbestos paste to manufacture the cement and asbestos members.

This invention aims at the feature of the extruded cement and asbestos, for example, that the asbestos in the paste tends to become masses to cause the organization of

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members uneven, the vibration method can not be adapted to make the organization compact, and a great amount of friction heat will be produced during extrusion. Therefore, the extruder of this invention is achieved on the basis of the existing extruder for the cement paste.

The extruder for cement and asbestos paste of this invention comprises a base and an extruding sleeve. A front end of the extruding sleeve is provided with an extruding outlet communicating with a die for a member. A rear end of the extruding sleeve is provided with a feeding inlet. At least one extruding screw connecting to a motor is provided in the extruding sleeve. An exhaust pipe communicating with the feeding inlet and connecting to a vacuum machine is also provided in the extruding sleeve. The output area of the extruding outlet is smaller than the input area thereof. The periphery of the extruding sleeve are provided with a cavity and a water-cooling chamber of pipes for charging and discharging water. The feeding inlet communicates with a delivering sleeve. A rear end of the delivering sleeve is provided with a hopper. At least one delivering screw connecting to the motor is provided in the delivering sleeve and at least one fixing stirrer having flat triangular blades is provided in the delivering sleeve.

The flowing passage of the extruding outlet has a shape of a conical tube so that the extruding force exerted on the paste flowing through the extruding outlet can be gradually increased.

The water-cooling chamber is annular and constituted of the extruding sleeve and the outer sleeve thereof. A plurality of annular heat sinks are provided in the outer periphery of the extruding sleeve of the water-cooling chamber. These heat sinks have the function of heat-dissipating and reinforcing.

A plurality of longitudinal inserting strips are provided in the inner periphery of the extruding sleeve. The inserting strips can be made from wear-resistant materials and can be changeable so as to decrease the wear of the extruding sleeve and prevent the pressure leakage due to the wear.

The extruding sleeve and the delivering sleeve can be arranged in the same direction or in an angle, preferably arranged in a right angle. Such arrangement advantageously reduces the volume and weight of the extruder.

Preferably, there are two delivering screws in the delivering sleeve to facilitate the sufficient mix and stir of the paste. The fixing stirrer can be regularly or unregularly

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arranged one by one in the delivering sleeve and can also be made into annular portions. In the inner periphery of the annular portions, several blades and a plurality of annular fixing stirrers for loosening and cutting the asbestos mass are provided.

The middle section of the exhaust pipe is provided with a vacuum chamber for storing and removing the paste entering the exhaust pipe during the operation of a vacuum machine.

In the operation of the extruder for cement and asbestos paste of this invention, after the motor is activated, the cement and asbestos paste mixed and stirred uniformly is fed into the delivering sleeve through the feeding inlet and moves toward the extruding sleeve under the push of the delivering screw. Meanwhile, the paste is further mixed and stirred. The asbestos mass is loosened and cut by the stirrer, entering the extruding sleeve through the feeding inlet, and moving toward the extruding outlet under the push of the extruding screw. The paste rubs against the extruding sleeve, the extruding screw to produce a great amount of friction heat. The heat sinks and the cooling water in the water-cooling chamber dissipate and absorb the friction heat to prevent the extruding sleeve, the extruding screw and the accessories thereof from increasing temperature and thus reducing the strength. At the same time, the vacuum machine draws out via the exhaust pipe the residual gas in the paste and the gas expanded by the friction heat so that bubbles will not occur in the members to reduce the strength. After the paste enters the extruding outlet, owing to the reduction of the area of the extruding outlet, the paste drained through the extruding outlet and entering the die for members will be extruded again so that the cement and asbestos members of high quality can be made.

The extruder for cement and asbestos paste of this invention has the following advantages and effects.

1. This invention makes practicable the mechanization of manufacturing the cement and asbestos architectural members by extrusion.

2. This invention has a structure that the paste is immediately extruded and delivered after it has been stirred and loosened. As a result, this invention can efficiently prevent the asbestos in the paste from depositing to form a mass and thus improve the uniformity of the organization of the members.

3. This invention employs cooling to lower temperature, vacuum suction, pressure raise in the extruding outlet and inserting strips of wear-resistant material so that the

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paste can get high accumulation of pressure and high density. Further, the members will have higher strength and the life of the extruder can be prolonged.

4. In comparison with the conventional method, this invention will not waste raw materials and can also use the asbestos materials having short fibers. Since the extrusion is carried out under the sealing state, it will not produce any water or air pollution. This conforms to the requirement of the environment conservation.

5. Various architectural member of required cross section can be made in one procedure by using the dies for members of this invention. However, the conventional methods should take two or more procedures.

This invention will be further explained by means of the preferred embodiments together with the accompanying drawings.

Fig. 1 is a top view of the extruder for the cement and asbestos paste of this invention, showing that the extruding sleeve is perpendicular to the delivering sleeve constituted of a delivering sleeve 42 and a delivering sleeve 43.

Fig. 2 is an enlarged sectional view taken along the line A-A of Fig. 1, showing the structure comprising an extruding sleeve constituted of a moveable sleeve 1 and a fixing sleeve 2, an extruding outlet 10, a water-cooling chamber 14, an extruding screw constituted of an extruding shaft 21 and an extruding piece 22, a feeding inlet, a delivering sleeve, two delivering screws constituted of delivering shafts 50, 51 and delivering pieces 48, 52.

Fig. 3 is an enlarged sectional view taken along the line B-B of Fig. 1, showing the structure comprising a delivering sleeve, a delivering screw constituted of a delivering shaft 51 and a delivering piece 52, an upper hopper 47, a feeding inlet 12, an extruding sleeve, an extruding screw, a vacuum chamber 13 and an exhaust pipe 38.

Fig. 4 is an enlarged sectional view taken along the line C-C of Fig. 2, showing the structure of the water-cooling chamber 14 having an annular cavity and inserting strips 5.

Fig. 5 is an enlarged sectional view taken along the line D-D of Fig. 3, showing the structure of the annular fixing stirrer 45 and blades 46.

(The first embodiment)

The extruder for cement and asbestos paste of this embodiment (as shown in the

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drawings) comprises an extruding part and a delivering part with 3361mm in total length, 2593mm in width and 1373mm in height.

The extruding part is constituted of an extruding sleeve, an extruding outlet, a feeding inlet, a water-cooling chamber and extruding screws. The extruding sleeve is of a cylindrical shape and comprises a moveable sleeve 1 and a fixing sleeve 2. The ends of the moveable sleeve and the fixing sleeve are connected by bolts 3. In the inner periphery of the moveable sleeve are uniformly provided 8 inserting strips 5 mounted by screws 4. The inserting strips are preferably made from wear-resistant materials, such as 60MnZ, and can be changeable after being worn. The fixing sleeve comprises an upper half circular tube 6 and a lower half circular tube 7 connected by bolts 8. The lower portion of the fixing sleeve is provided with a base 9 mounted on the ground by screws. The extruding outlet 10 has the shape of a conical tube with the conic angle of 45°. The outlet area of the extruding outlet is smaller than that of the inlet. The inlet end of the extruding outlet and the outlet end of the moveable sleeve are connected by bolts 11. The feeding inlet 12 also has a shape of a conical tube and the smaller end thereof is vertically connected to the upper portion of the rear end of the fixing sleeve 2. In the base is provided with a vacuum chamber 13 having a squared cavity. The vacuum chamber communicates with the vacuum machine (not shown in the drawings). The water-cooling chamber 14 has a shape of a sealed annular cavity constituted of outer sleeves 15. The outer sleeve comprises an upper half circular tube 16 and a lower half circular tube 17 connected by bolts 18. Of course, a whole circular tube can be used. The outer periphery of the moveable sleeve 1 of the extruding sleeve in the water-cooling chamber are provided with a plurality of annular heat sinks 1. A pipe 19 for charging water communicating with the annular cavity is connected to the top of the outer sleeve. A pipe 20 for discharging water communicating with the annular cavity is connected to the bottom of the outer sleeve. The extruding screw is provided with a cylindrical extruding shaft 21 and a spiral extruding piece 22 welded on the peripheral surface of the shaft. The rear end of the extruding shaft is provided with a stepped journal. The journal can be mounted in the bearing seat 25 provided with universal rolling bearings 23, 24 functioning as stoppers. The bearing seat is fixedly mounted on the ground by screws so that the extruding screw is in a cantilever structure. Universal sealing tiles 26 are mounted between the reduced end of the fixing sleeve 2 and the

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bearing seat 25. The journal protrudes through the end of the bearing seat and is connected to the output shaft of the transmission box 28. The input shaft of the transmission box, belt pulleys 29 and the motor 30 are in transmission connection.

The delivering part is constituted of a delivering sleeve, a fixing stirrer, an upper hopper and two delivering screws. The delivering sleeve is perpendicular to the extruding sleeve and has a long cylindrical shape with a cross section of a flat circle. Two circular passages accommodating the delivering screws are provided in the delivering sleeve. These two passages can be separated from or communicated with each other. The lower portion of the delivering sleeve is provided with a framework base 35 fixedly mounted on the ground by screws. The front end of the delivering sleeve is provided with a feeding outlet 36. The feeding outlet 36 and the feeding inlet 12 of the extruding sleeve are connected together by bolts 37. Between the cylindrical portion of the feeding outlet 36 and the vacuum chamber in the base of the extruding sleeve, the feeding outlet communicates with the vacuum chamber through the exhaust pipe 38. The conical tube portion of the feeding inlet 12 of the exhaust pipe can also communicate with the vacuum chamber through the exhaust pipe 38. The delivering sleeve is an integral passage. The present embodiment adapts the horizontal division. The upper half tube 39 and the lower half tube 40 are connected together by bolts 41. The delivering sleeve is constituted of the delivering sleeve I 42 and the delivering sleeve II 43 connected by bolts 44. The fixing stirrer 45 is sandwiched between the delivering sleeves I and II. The fixing stirrer has a flat and double-ring shape. Each of the rings corresponds to a delivering screw. In the inner periphery of the ring, a plurality of blades having flat triangular shape are provided. The upper hopper 47 has a shape of a squared conical tube and vertically penetrates the rear end of the delivering sleeve. The two delivering screws are mounted in the delivering sleeve and each has the same shape and size. The cylindrical delivering shafts 50, 51 and the spiral delivering pieces 48, 52 welded on the peripheral surface of the two delivering shafts are provided. Both ends of the shaft protruding from the journal of the delivering sleeve are mounted in the bearing seats 55, 56 of the rolling bearing 53, 54, respectively. The rear ends of the shafts protruding through the end of the bearing seat are mounted to a gear 57, 58 having the same number of teeth, respectively. The gear 58 is engaged with the gear 60 fixedly mounted in the end of the output shaft of the transmission box 59. The input

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shaft of the transmission box is in transmission connection to the belt pulleys 61 and motor 62.

The mouth portion of the extruding outlet of the extruder for cement and asbestos paste of this invention is provided with a die 49 for a member. After activating the motor 30, 62 and feeding the cement and asbestos paste mixed uniformly from the upper hopper, the machine starts to operate. The paste moves forwardly in the delivering sleeve under the stirring, extruding and pushing of the delivering screws rotating synchronously and reversely. In the middle way, after the fixing stirrer loosens and cuts the massed asbestos, the paste moves to the feeding outlet and is drew out the air by the vacuum chamber and the exhaust pipe of the vacuum machine. After that, the paste enters the extruding sleeve through the feeding inlet and is extruded to the extruding outlet by the extruding screw. After the pressurization of the extruding outlet, the inner pressure of the paste is 145kg/cm^2, the flow rate is about 3m/min, and the extruding amount is about 5 tons/hr. The paste is injected into the die 49 for a member to manufacture a cement and asbestos member.

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We hope that the above serves your concern and are looking forward to hearing from you.

Very truly yours,
Taiwan International Patent & Law Office

J. K. Lin
Attorney-at-Law
Patent Attorney

CKB/sjl